Roll-to-Roll Solution-Processible Small-Molecule OLEDs (R2R SM OLEDs)

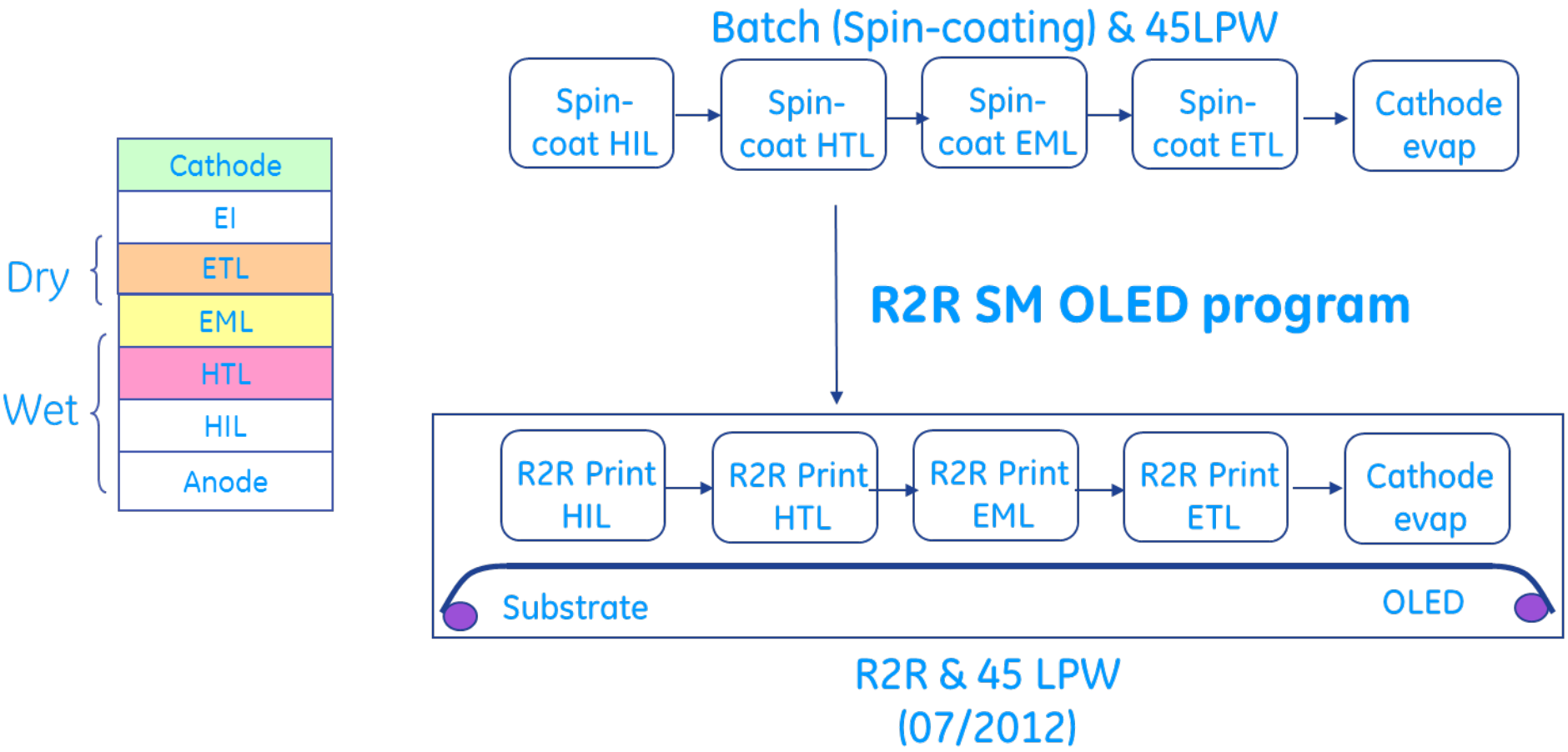
Prime Recipient: GE Global Research
Subcontractor: DuPont Display
Contract #: DE-EE0003250
NETL Project Manager: Clark Robinson

Principal Investigator: Jie Jerry LIU

GE Global Research

DOE SSL Manufacturing R&D Workshop, San Jose, CA, June 13-14, 2012

Program Objective



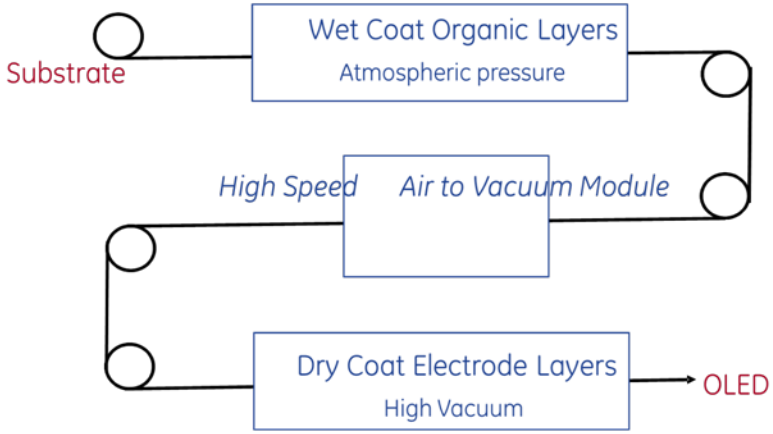
OLED mat'ls/inks, processes, equipment, input materials, supply chain ...

Team Expertise

Cathode
EI
ETL
EML
HTL
HIL
Anode

DuPont: Wet-coatable OLED materials

GE: all wet & orthoganol



GE: R2R R&D infrastructure

Program Milestones & Status

Milestone	Description	Date of completion	
		Target	Actual (est)
1	Complete SM-OLED ink-formulation & process specification	Q4	Q4
2	Demonstrate 20LPW R2R SM-OLED	Q4	Q5
3	Emission uniformity with variation in brightness <20%	Q7	Q5 Q9* (est.)
4	Completion of all wet R2R SM OLED architecture design	Q7	Q7
5	Demonstration of 45LPW R2R SM-OLED	Q8	Q9* (est.)

Key technical achievements

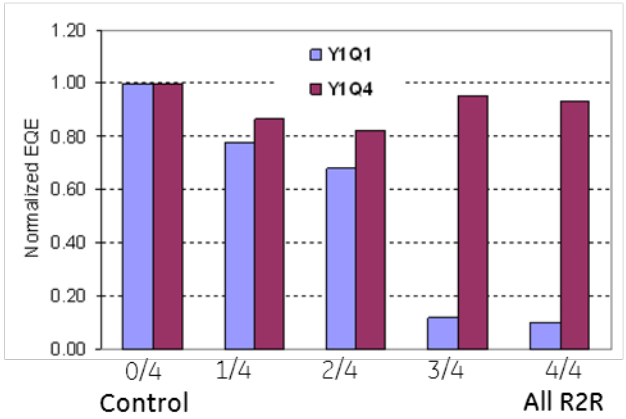
1. Proven wet-coating capable for high performance

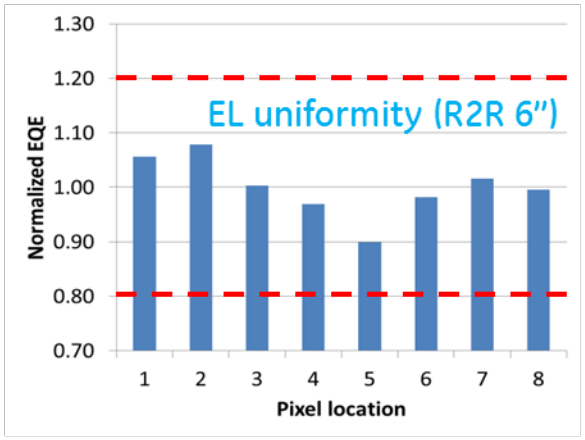
With external light extraction only

	LPW	CCT (K)	CRI	dBB
WHITE	62	3000	85	0.002

	T70 (hrs)	T50 (hrs)
RED	~55,000	~130,000
GREEN	~170,000	~300,000

2. Developed equipment designs & process know-hows





3. Retired major component risks key to (R2R) OLED

- (low-cost) barrier substrates
- (low-cost) encapsulation

Program Summary

1. **Program execution on/within budget**
2. **Achieved significant risk-reduction for Wet OLEDs**
   - Retired major coating-related risks
   - Retired major equipment-related risks
   - Retired major component-related risks
3. **Proven entitlement for wet OLEDs**
   - Demonstrated all wet-coated Green & Red OLEDs w/ record life
   - Demonstrated all wet-coated White OLEDs w/ record LPW
4. **Future plans**
   - Process & equipment optimization to ***minimize footprint & capex***
   - Material & process optimization to ***minimize operation cost***
   - High rate cathode deposition for ***thru-put***